Space Weather Forecast

Issued on Friday, 26 April 2024 at 13:09 Local

This forecast provides a four day assessment of space weather events. The probabilities stated below are for reaching or exceeding the given levels. For more information about space weather impacts please see the Met Office Space Weather Scales https://www.metoffice.gov.uk/weather/learn-about/space-weather/uk-scales

Space Weather Forecast Headline: Risk of R, G and S-scale events all falling during the coming four-day period.

Solar Activity: Solar activity was moderate in the past 24 hours, with the peak flare being an impulsive small Moderate-class flare observed from part of the off-going agglomeration of sunspot regions on the southwestern solar horizon at 25/1712UTC. The flare trace itself showed contrasting behaviours of fewer large Common and small Moderate-class flares, but at the same time exhibited a gradually rising background to more comfortably lie within Common-class. The gradual rotation onto the western solar horizon of this mass of active regions in the past 24 hours has reduced the overall number of sunspot groups to around ten as of the last solar analysis.

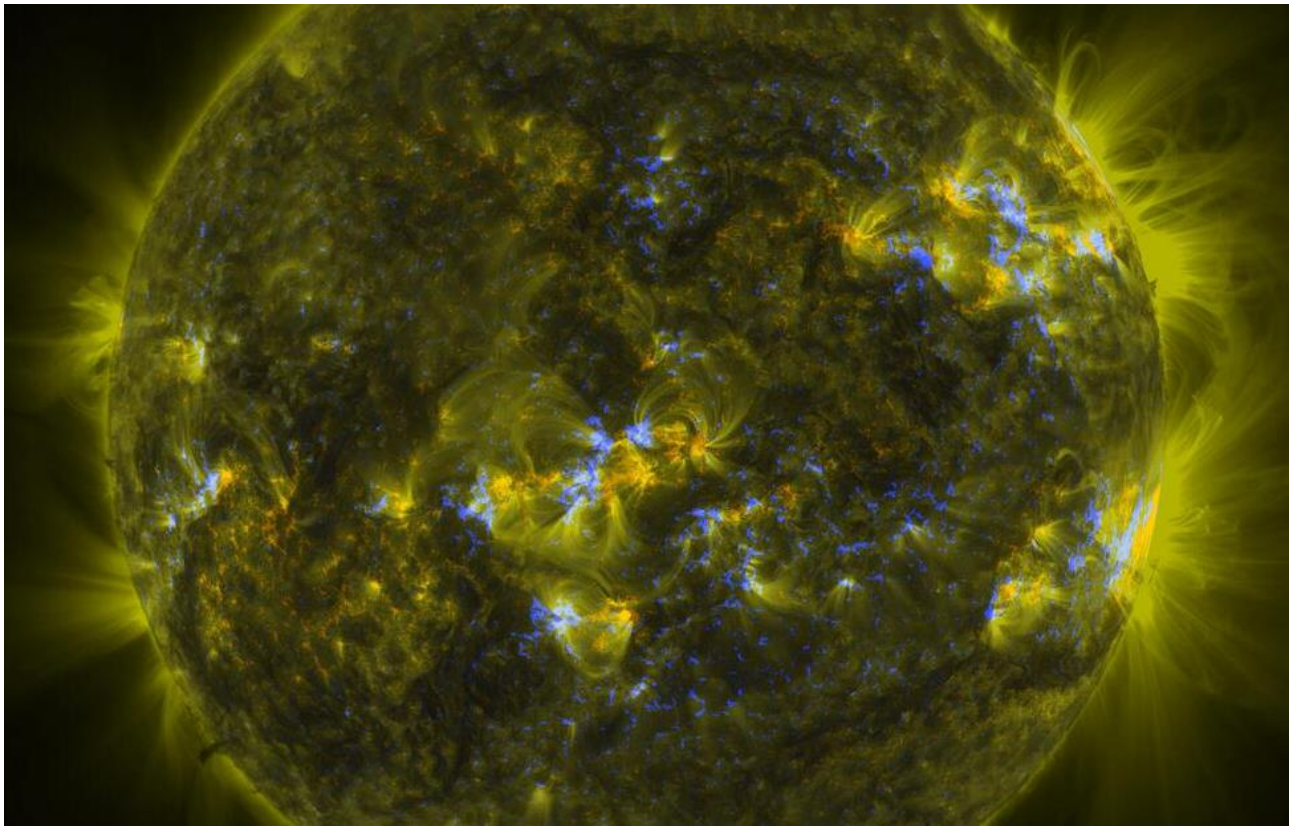

Figure 1: False-colour extreme UV and magnetic field proxy composite image from 26/1130UTC showing the strong assymetry in sunspot regions and emanating flux from east to west across the facing side of the Sun. The western horizon will shortly show a decrease in activity as the regions responsible rotate away onto the far side.

Much of the surviving Earth-facing sunspot population comprises smaller regions than of late, although there are some more developmental areas - namely a group in the southwest, with a

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trailing spot growing to its southeast. It has been generally true of the period that some of the remining larger and more complex regions showed decaying areal trends, with these groups including one near the middle of the Sun, and a second in the northwest.

The cadence of observed Coronal Mass Ejections (CMEs) remains relatively high on imagery, although those observed in the period were either high latitude peripheral features or else far-sided. No new observed events were added to the CME roster in the 24 hours.

Figure 2: SIDC ROB visualation of Common-class flares and above in the 24 hours to 26/1130UTC, showing the dominance of the offgoing southwest (numerous white pixels). This is the rationale for the steep drop in daily risk of significant flares beyond 24 hours' time.

Solar Wind / Geomagnetic Activity: Solar winds showed an initial slow regime, transitioning to minor CME influence shortly after UTC midnight. The CME responsible is not known, however an upstream satellite shows brief glimpses of a similarly-timed arrival amongst data gaps, which perhaps hints at an western solar hemisphere CME candidate. This is, however, conjectural - and scarcely narrows the candidate list given the rate of emissions from regions like those now departing the southwest.

The solar wind speed initially showed a slow decline before undergoing a step-change upwards before settling nearer by the period's end - all near typical background levels. The number of particles comprising the solar wind was less conclusive given the low values involved, but perhaps showed a slight increase after the arrival. The associated magnetic field, which had been steady at background in the tail of the UTC day of Thursday rose to a slightly elevated high after the CME, with the north-south component mainly anti-aligned with respect to Earth's field.
The net result of the above solar wind measures was nevertheless subdued, perhaps because of the low solar wind speeds and densities involved.

Energetic Particles / Solar Radiation: Solar radiation levels were very slightly above resting

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background levels (since 24/1400UTC) with the culprit most likely to be associated with southwestern quadrant Moderate-class flare activity. Even at peak this registered at fractions of a pfu (where 10pfu is Minor Solar Radiation Storm S1).

Four-Day Space Weather Forecast Summary

Solar Activity: The X-ray forecast should see decreasing risks overall into the coming UTC weekend, as the cluster of southwestern regions more fully rotates off the facing side. Likely Moderate-class activity should fall to a chance during this time, with Strong-class showing a similar decrease within a daily slight chance.

Solar Wind / Geomagnetic Activity: There is now a reduced risk of further minor CME influence during the first half of the four-day period after the passage of a minor CME in the current UTC day. Any CME may combine with an emerging fast wind into the coming UTC weekend to perhaps give a peak slight chance of Minor Geomagnetic Storm G1 as a result. From here, the chances of further such incidences should fall, with fast winds emanating from lower solar latitude 'coronal holes' perhaps glancing Earth in turn into the new UTC week. The result is that more reliably quiet geomagnetic conditions should develop later in the period.

Energetic Particles / Solar Radiation: Solar radiation is likely to remain at Background levels, but with a daily slight chance of reaching the S1/Minor Radiation Storm threshold, now judged to gradually reduce later in the four days with the continuing passage of the southwestern cluster of sunspot groups onto the far side.

Geomagnetic Storms:

Geo-Magnetic Storm Probability (Exceedance)	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Minor or Moderate	G1 to G2	No	10	15	5	1
Strong	G3	No	1	1	1	1
Severe	G4	No	1	1	1	1
Extreme	G5	No	1	1	1	1

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Radio Blackouts - X Ray Flares:

X Ray Flares	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC)	Day 2 (00-24 UTC)	Day 3 (00-24 UTC)	Day 4 (00-24 UTC)
Probability			(%)	(%)	(%)	(%)
Active	R1-R2 M Class	No	60	50	30	30
Very Active	R3 to R5 X	No	15	10	5	5

Solar Radiation Storms - (High Energy Protons):

Radiation Storms	Level (cm^{-2} sr^{-1} s^{-1})	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC)	Day 2 (00-24 UTC)	Day 3 (00-24 UTC)	Day 4 (00-24 UTC)
Probability (Exceedance)			(%)	(%)	(%)	(%)
Active	≥ S1	No	15	10	10	5
Very Active	≥ S3 *	No	1	1	1	1
* S3 ≥ 10 MeV ≥ 1000 pfu and / or ≥ 50 MeV ≥ 10 pfu. (pfu = $cm^{-2}sr^{-1}s^{-1}$)						

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